

Notice of Allowability	Application No.	Applicant(s)	
	10/815,065	SHARAN ET AL.	
	Examiner	Art Unit	
	Asok K. Sarkar	2891	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to amendment filed 9/13/2005.
2. ☒ The allowed claim(s) is/are 41 and 43-86.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|---|--|
| <ol style="list-style-type: none"> 1. <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) 3. <input checked="" type="checkbox"/> Information Disclosure Statements (PTO-1449 or PTO/SB/08),
 Paper No./Mail Date <u>5/12/05</u> 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit of Biological Material | <ol style="list-style-type: none"> 5. <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) 6. <input type="checkbox"/> Interview Summary (PTO-413),
 Paper No./Mail Date _____ 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance 9. <input type="checkbox"/> Other _____ |
|---|--|

DETAILED ACTION

Terminal Disclaimer

1. The terminal disclaimer filed on September 13, 2005 disclaiming the terminal portion of any patent granted on this application, which would extend beyond the expiration dates of US 6,737,328 and US 6,759,306 has been reviewed and is accepted. The terminal disclaimer has been recorded.

EXAMINER'S AMENDMENT

2. The Applicant's representative was contacted for amending claims in order to overcome prior art.

3. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with James E. Lake on October 21, 2005.

The application has been amended as follows:

Claim 42 has been cancelled.

In claim 41, line 8, following the phrase " depositing the silicon dioxide", - - and maintaining a temperature of the substrate at greater than or equal to 500 °C during the depositing - - has been inserted.

In claim 75, line 15, following number 500, the symbol " □C ", has been deleted and - - °C - - has been inserted.

Allowable Subject Matter

4. Claims 41 and 43 – 86 are now allowed.
5. The following is an examiner's statement of reasons for allowance:

Claims 41 and 43 recite, inter alia, a method of forming a silicon dioxide layer, comprising forming a high density plasma proximate a substrate, flowing gases into the plasma, at least some of the gases forming silicon dioxide, depositing the silicon dioxide formed from the gases over the substrate, and not cooling the substrate with a coolant while depositing the silicon dioxide and maintaining a substrate temperature near 500 °C during deposition. Although Yang, US 6,110,544 teaches forming the silicon oxide on a substrate by high density plasma process, he fails to teach holding the substrate at a temperature near 500 °C during deposition. Additionally, the art of record does not disclose or anticipate the above limitation in combination with other claim elements nor would it be obvious to modify the art of record so as to form a device including the above limitation.

Claims 44 – 49 recite, inter alia, a method of forming a silicon dioxide layer, comprising forming a high density plasma proximate a substrate, flowing gases into the plasma to deposit silicon dioxide, while depositing the silicon dioxide and maintaining a substrate temperature near 500° during deposition and etching the deposited oxide with the plasma with a deposition/etch ratio of 6:1. The art of record does not disclose or anticipate the above limitation in combination with other claim elements nor would it be obvious to modify the art of record so as to form a device including the above limitation.

Claims 50 – 67 recite, inter alia, a method of forming a silicon dioxide comprising forming an opening extending into a substrate, forming a first layer of silicon dioxide within the opening and forming a second layer of silicon dioxide within the opening, the forming of the second layer of silicon dioxide comprising forming a high density plasma proximate the substrate, flowing gases into the plasma, at least some of the gases forming silicon dioxide while maintaining the substrate at a temperature of at least about 500°C and while maintaining the substrate at said temperature, depositing the silicon dioxide formed from the gases within the opening. The art of record does not disclose or anticipate the above limitation in combination with other claim elements nor would it be obvious to modify the art of record so as to form a device including the above limitation.

Claims 68 – 74 recite, inter alia, a method of forming a silicon dioxide comprising forming an opening extending into a substrate, forming a first layer of silicon dioxide within the opening by thermal oxidation and forming a second layer of silicon dioxide within the opening to fill the opening, the forming of the second layer of silicon dioxide comprising forming a high density plasma proximate the substrate, flowing gases into the plasma, at least some of the gases forming silicon dioxide while maintaining the substrate at a temperature of at least about 500°C and while maintaining the substrate at said temperature, depositing the silicon dioxide formed from the gases within the opening to achieve better step coverage. The art of record does not disclose or anticipate the above limitation in combination with other claim elements nor would it be obvious to modify the art of record so as to form a device including the above limitation.

Claims 75 – 86 recite, inter alia, a method of forming a method of forming a shallow trench isolation region, comprising forming a pad oxide layer and forming a silicon nitride layer over the pad oxide layer, forming an opening extending through the silicon nitride layer and through the pad oxide layer and into the substrate, forming a first layer of silicon dioxide within the opening, and forming a second layer of silicon dioxide over the first layer within the opening, material from the first and second layers within the opening being comprised by the shallow trench isolation region and the forming of the second layer of silicon dioxide comprising forming a high density plasma proximate the substrate, flowing gases into the plasma, at least some of the gases forming silicon dioxide, maintaining the substrate at a temperature of at least about 500 °C and while maintaining the substrate at said temperature, depositing the silicon dioxide formed from the gases within the opening. The art of record does not disclose or anticipate the above limitation in combination with other claim elements nor would it be obvious to modify the art of record so as to form a device including the above limitation.

Conclusion

6. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Asok K. Sarkar whose telephone number is 571 272 1970. The examiner can normally be reached on Monday - Friday (8 AM- 5 PM).

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William B. Baumeister can be reached on 571 272 1722. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

8. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Asok K. Sarkar
October 24, 2005

Primary Examiner